



Sonoma Technology, Inc.
Air Quality Research and Innovative Solutions

**NINTH QUARTERLY REPORT OF AMBIENT AIR
QUALITY MONITORING AT SUNSHINE CANYON
LANDFILL AND VAN GOGH ELEMENTARY SCHOOL
(December 1, 2009–February 28, 2010)**

**Quarterly Report
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TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
LIST OF FIGURES	iv
LIST OF TABLES.....	v
EXECUTIVE SUMMARY	ES-1
ES.1 BACKGROUND	ES-1
ES.2 STATISTICS	ES-1
ES.3 LANDFILL GAS SAMPLING	ES-1
ES.4 MONITORING INFRASTRUCTURE	ES-1
1. INTRODUCTION	3
2. DATA COMPLETENESS.....	3
3. PM ₁₀ EXCEEDANCES	4
4. AVERAGE AND MAXIMUM BLACK CARBON CONCENTRATIONS.....	4
5. LANDFILL GAS SAMPLING	5
5.1 Methane.....	5
5.2 Non-Methane Organic Compounds (NMOC)	5
6. MONITORING SITE INFRASTRUCTURE UPGRADE COMPLETED	7
7. FIELD OPERATIONS	8

LIST OF FIGURES

<u>Figure</u>		<u>Page</u>
Figure 5-1.	Ranges of the 10 th to 90 th percentile quarterly averages and median values for available Los Angeles and Ventura county NMOC data from 2005 forward.	7

LIST OF TABLES

<u>Table</u>		<u>Page</u>
Table 2-1.	Data completeness statistics for the recent monitoring quarter, December 1, 2009, through February 28, 2010.....	3
Table 3-1.	Number of exceedances of federal and state 24-hr PM ₁₀ standards during the current quarter and the December 1-through-February 28 quarterly periods of the baseline year (November 22, 2001, to November 21, 2002), 2007 to 2008, and 2008 to 2009.....	4
Table 4-1.	Comparison of 24-hr black carbon concentrations for the current quarter with those measured in the December 1-through-February 28 quarterly periods from the original baseline year (November 22, 2001, to November 21, 2002), 2007 to 2008, and 2008 to 2009.....	4
Table 5-1.	Ambient methane concentrations from the December 29, 2009, LFG sampling at Sunshine Canyon Landfill and Van Gogh School.....	5
Table 7-1.	Sunshine Canyon Landfill monitoring site visits and field maintenance and operations from December 1, 2009, through February 28, 2010.	8
Table 7-2.	Van Gogh School monitoring site visits and field maintenance and operations from December 1, 2009, through February 28, 2010.	9
Table 7-3.	Flow rates for the BAM PM ₁₀ monitors and Aethalometer™ BC monitors at the landfill and school sites from December 1, 2009, through February 28, 2010.....	10

EXECUTIVE SUMMARY

ES.1 BACKGROUND

Continuous monitoring of meteorological and air quality parameters began at the Sunshine Canyon Landfill and Van Gogh Elementary School in the nearby community of Granada Hills in fall 2007. PM₁₀ (particulate matter less than 10 microns in aerodynamic diameter) is measured hourly, and wind speed, wind direction, and black carbon (BC, a surrogate for diesel particulate matter) are measured as 5-minute averages and reported as hourly averages. The collected data undergo quarterly validation and are evaluated for completeness. PM₁₀ concentrations are compared with federal and state PM₁₀ standards. When PM₁₀ exceedances occur, additional comparisons are made with the historical, regional, and annual ambient PM₁₀ concentrations. At least annually, the PM₁₀ and BC data undergo analysis to characterize the impact of landfill operations on ambient air quality on a neighborhood scale. The validated hourly data and a summary of the analytical results and field operations are reported to the Planning Department of the City of Los Angeles.

ES.2 STATISTICS

Data capture for the monitoring period, December 1, 2009, through February, 2010, was excellent for PM₁₀ and wind parameters at both sites. About one-third of the quarterly BC data were missing at each site because the instruments were temporarily removed for service and hardware upgrades during the latter portion of the period. There were no exceedances of the 150 µg/m³ 24-hr federal PM₁₀ standard, and no exceedances of the more stringent 24-hr California state PM₁₀ standard (50 µg/m³). Average 24-hr BC concentrations were lower than those measured during the December-to-February quarter of the baseline year (2001-2002) and within the range of concentrations measured during parallel periods in 2007-2008 and 2008-2009.

ES.3 LANDFILL GAS SAMPLING

Landfill gas (LFG) sampling was conducted on December 29, 2009. Methane concentrations were within the range of 1.6 to 2.1 ppm, similar to global ambient levels. Concentrations of non-methane organic compounds (NMOC) were relatively low and within the normal range of values for the Los Angeles area.

ES.4 MONITORING INFRASTRUCTURE

Ambient air monitoring infrastructure upgrades funded by Browning-Ferris Industries (BFI) have been completed at the two monitoring sites. These include new air conditioning units, application of roof sealant, additional insulation installed in trailer interior walls and

ceiling, new data acquisition system hardware and software, upgrades and service of the Aethalometer™ BC monitors, and purchase and installation of new wind monitors.

1. INTRODUCTION

This report provides a summary of data completeness, ambient PM₁₀ concentrations, average and maximum black carbon (BC) concentrations, landfill gas (LFG) sampling results, instrument flow rate verification (quality control) data, and field operations for the recent quarterly period December 1, 2009, through February 28, 2010. Data from this quarterly period represent the first three months of the third year of continuous monitoring at the Sunshine Canyon Landfill and Van Gogh Elementary School monitoring sites.

2. DATA COMPLETENESS

Table 2-1 gives completeness statistics for all measured variables for the period December 1, 2009, through February 28, 2010. Data capture for BC was low (62%) at both monitoring sites because the Aethalometers™ were removed on January 25, 2010, and sent to the manufacturer for upgrades and service (the instruments were reinstalled on March 8, 2010). Data capture rates for PM₁₀ and meteorological parameters were excellent at both sites. However, about 7% of the PM₁₀ data at Van Gogh School were missing. This occurred on contiguous days between December 23 and December 29, when the monitor was turned off due to flow rate errors. The cause of the flow rate errors was not immediately apparent, but troubleshooting revealed the problem to be in faulty O-rings in the adapter used to connect the reference flow meter to the BAM plumbing, not in the BAM itself. At the Sunshine Canyon site, 14% of the captured wind data were deemed suspect. The existing wind sensor (which was replaced on March 8, 2010) exhibited high torque for the wind speed threshold, suggesting the base 5-minute averaged wind speeds could be biased at low wind speeds. All wind speeds below 2 mph were assigned a suspect data validation code.

Table 2-1. Data completeness statistics for the recent monitoring quarter, December 1, 2009, through February 28, 2010 (“WS/WD” is wind speed/wind direction).

Monitoring Location	Dates	Percent Data Capture ^a (%)			Percent Data Valid or Suspect (%) ^b			Percent Data Suspect (%) ^c		
		PM ₁₀	BC	WS/WD	PM ₁₀	BC	WS/WD	PM ₁₀	BC	WS/WD
Sunshine Canyon Landfill	12/1/09-2/28/10	100%	62%	100%	97%	100%	100%	0%	0%	14%
Van Gogh Elementary School	12/1/09-2/28/10	93%	62%	100%	98%	100%	100%	0%	0%	0%

^a Percent Data Capture is the percentage of collected data values divided by the total number of expected data intervals in the date range (e.g., for the raw BC 5-minute data, 12 data values are expected per hour and 288 data values are expected per day).

^b Percent Data Valid or Suspect is the percentage of data values that are either valid or suspect, divided by the number of captured data values.

^c Percent Data Suspect is the percentage of data values labeled as suspect divided by the number of captured data values.

3. PM₁₀ EXCEEDANCES

The federal and state PM₁₀ exceedances for the current quarter, the corresponding quarters of the previous two years, and the baseline year are summarized in **Table 3-1**. There were no exceedances of the 24-hr federal PM₁₀ standard or the California State PM₁₀ standard during the current quarter at either the Sunshine Canyon Landfill or the Van Gogh School. Ample surface moisture, either natural or applied, may have been a factor contributing to control of locally derived fugitive dust and associated PM₁₀.

Table 3-1. Number of exceedances of federal and state 24-hr PM₁₀ standards during the current quarter and the December 1-through-February 28 quarterly periods of the baseline year (November 22, 2001, to November 21, 2002), 2007 to 2008, and 2008 to 2009.

Regulatory Level	Avg. Period	PM ₁₀ Standard	Van Gogh School				Sunshine Canyon Landfill			
			12/1/01-2/28/02	12/1/07-2/28/08	12/1/08-2/28/09	12/1/09-2/28/10	12/1/01-2/28/02	12/1/07-2/28/08	12/1/08-2/28/09	12/1/09-2/28/10
Federal	24-hr	150 µg/m ³	0	0	0	0	0	1 (2/14/08)	1 (1/9/09)	0
State	24-hr	50 µg/m ³	7/70 (10%)	2/73 (3%)	6/85 (7%)	0	8/55 (15%)	10/85 (12%)	3/51 (6%)	0

4. AVERAGE AND MAXIMUM BLACK CARBON CONCENTRATIONS

While no federal or state standards exist for BC concentrations in ambient air, BC is a measurable component of ambient air that correlates well with diesel particulate matter (DPM). Because of growing evidence that DPM is associated with several negative health effects, BC is often measured in an attempt to quantify the relative amounts of DPM in ambient air.

Table 4-1 provides the 24-hr average and maximum 24-hr BC concentrations for December 1, 2009, through February 28, 2010, and compares these concentrations with data from corresponding quarters of the two most recent years and the baseline year (2001-2002). Both sites continue to exhibit lower ambient BC concentrations compared to the baseline year.

Table 4-1. Comparison of 24-hr black carbon concentrations for the current quarter with those measured in the December 1-through-February 28 quarterly periods from the original baseline year (November 22, 2001, to November 21, 2002), 2007 to 2008, and 2008 to 2009.

	BC Concentrations (µg/m ³)							
	Van Gogh School				Sunshine Canyon Landfill			
	12/1/01-2/28/02	12/1/07-2/28/08	12/1/08-2/28/09	12/1/09-2/28/10	12/1/01-2/28/02	12/1/07-2/28/08	12/1/08-2/28/09	12/1/09-2/28/10
Average 24-Hr	0.75	0.46	.55	0.63	0.85	0.54	0.57	0.72
Maximum 24-Hr	3.72	1.49	3.14	1.86	3.49	1.91	2.02	2.38

5. LANDFILL GAS SAMPLING

An LFG gas sampling event occurred on December 29, 2009. Between 7:00 and 9:00 a.m., a total of four separate, integrated (hourly) samples were obtained: two consecutive 1-hr samples from 7:00 to 8:00 a.m. and 8:00 to 9:00 a.m. local time at each of the two monitoring sites. The samples were analyzed for methane by method ASTM D1946, and non-methane organic compounds were analyzed by TO-15 using a Full Scan at Low level and by Selective Ion Monitoring using a special list of volatile organic compounds (VOC) targeting LFG. Two additional grab samples were obtained at each site to verify methane concentrations determined from the ASTM D 3416 analysis. Analysis of samples from the previous quarter had returned results below expected levels (northern hemisphere ambient global methane concentrations should not be less than about 1.8 ppmV).

5.1 METHANE

Methane concentrations in the atmosphere should not fall below 1.75 ppmV in the northern hemisphere. The ASTM D 3416 analytical technique has a precision of 20%, so values of 1.6 ppm or above are considered reliable.

Table 5-1 shows the concentrations measured for the December 29 LFG sampling. One grab sample (Sunshine Canyon Landfill at 7:15 a.m.) is outside the range of expected values for ambient methane concentrations.

Table 5-1. Ambient methane concentrations from the December 29, 2009, LFG sampling at Sunshine Canyon Landfill and Van Gogh School.

Sample Type	Sample Time	Methane Concentration (ppmV)	
		Sunshine Canyon	Van Gogh School
Integrated	07:00-08:00	1.93	1.55
	08:00-09:00	2.14	2.07
Grab	07:15	1.41	1.85
	08:15	1.55	1.96

5.2 NON-METHANE ORGANIC COMPOUNDS (NMOC)

The current ambient air monitoring program at the landfill and school sites includes analyses for several compounds. The rationale for choosing the compounds is discussed in STI's *First Annual Report of Ambient Air Quality Monitoring at Sunshine Canyon Landfill and Van Gogh Elementary School (May 10, 2007-May 30, 2008)*. The compounds include NMOCs commonly associated with landfills, in particular those specified in SCAQMD's Core Group of "Carcinogenic and Toxic Air Contaminants" in Rule 1150.1. Other compounds included are not listed in SCAQMD's Core Group but appear in the listing of the Agency for Toxic Substances and Disease Registry, part of the U.S. Centers for Disease Control and Prevention.

Results from the December 29, 2009, sampling event are presented graphically in **Figure 5-1**. As in previously submitted reports, the figure illustrates how the samples compare to averaged Los Angeles County and Ventura County data from 2005 to the present. The figure also compares of the sample data with the Method Detection Limits (MDL) for the compounds. Data shown below the MDL are considered nondetectable.

Some of the compounds associated with landfill emissions have been classified by the U.S. Environmental Protection Agency (EPA) as environmental and health hazards, or air toxics. Cancer and noncancer health benchmarks have been established for many of these compounds. Sample concentrations are compared to cancer benchmarks in the figure. Exposure to concentrations at this level for 70 years would be expected to result in one additional case of cancer per million people. Noncancer health benchmarks also assume a 70-year exposure but refer to noncancerous conditions such as asthma, neurological effects, and reproductive effects. All measured concentrations are below the noncancer health benchmarks.

Results indicate that all compounds were within the expected range for the Los Angeles area.

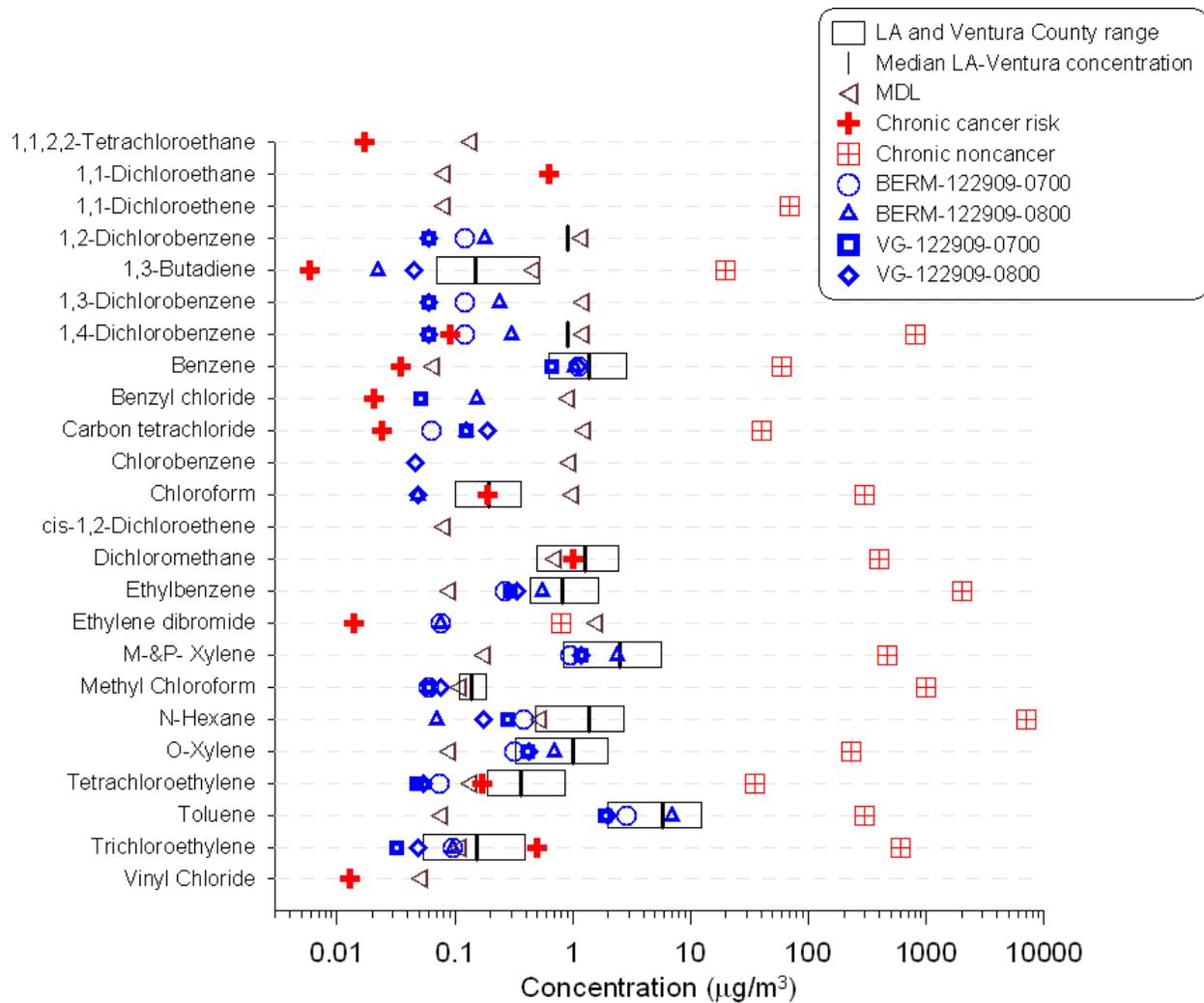


Figure 5-1. Ranges of the 10th to 90th percentile quarterly averages and median values for available Los Angeles and Ventura County NMOC data from 2005 to the present; concentrations determined from the December 29, 2009, samples collected at the Sunshine Canyon Landfill (“Berm”) and Van Gogh School (“VG”) sites; MDL; and chronic cancer risk and noncancer benchmarks. If data are not shown, the compounds were “not detected.”

6. MONITORING SITE INFRASTRUCTURE UPGRADE COMPLETED

Infrastructure upgrades at the Sunshine Canyon Landfill and the Van Gogh Elementary School ambient air quality monitoring sites were recently completed. The trailers have newly installed insulation in the walls and ceilings and new air conditioning units. The roofs have been sealed against water leaks. Maintaining an adequate environment in the enclosures, particularly with regard to temperature range, is important for the proper operation of the BAM used for PM₁₀ monitoring, the Aethalometer™ that tracks ambient BC concentrations, and the computer-based data acquisition system (DAS) that controls the instrumentation and logs and transmits the

data. BFI provided funding for the upgrades. Technicians from Sonoma Technology, Inc. procured, acceptance-tested, and installed the equipment.

7. FIELD OPERATIONS

Tables 7-1 and 7-2 list dates and major tasks associated with visits to the Sunshine Canyon Landfill and Van Gogh School sites, respectively, between December 1, 2009, and February 28, 2010. **Table 7-3** shows the PM₁₀ and BC monitors' flow rates, as reported by the monitors and measured with an NIST-traceable flow standard.

Table 7-1. Sunshine Canyon Landfill monitoring site visits and field maintenance and operations from December 1, 2009, through February 28, 2010.

Date of Site Visit	Description of Work
Tuesday, December 1, 2009	Flow checks on PM ₁₀ and BC samplers. Clean BAM nozzle and vane. Collect PM ₁₀ and BC data.
Monday, December 7, 2009	Recover log book sheets. Make measurements for A/C unit, insulation, and plywood.
Tuesday, December 22, 2009	Flow checks on PM ₁₀ and BC samplers. Clean BAM nozzle and vane. Collect PM ₁₀ and BC data.
Tuesday, December 29, 2009	LFG samples from 7:00 a.m. to 9:00 a.m. Flow checks on PM ₁₀ and BC samplers.
Monday, January 4, 2010	New air conditioner installed.
Wednesday, January 6, 2010	Trailer refurbishment: Seal roof, prep and cut insulations for walls and ceiling.
Thursday, January 7, 2010	Trailer refurbishment: Paint floor and lay out plywood.
Friday, January 8, 2010	Trailer refurbishment: Continue insulation and plywood installation; complete roof work.
Monday, January 11, 2010	Trailer refurbishment: Finalize insulation and plywood. Dispose of old A/C unit. Collect PM ₁₀ and BC data. Flow and leak checks on PM ₁₀ and BC samplers.
Friday, February 12, 2010	Collect PM ₁₀ data (BC out for upgrade). Flow and leak checks on PM ₁₀ . Clean BAM capstan, roller, nozzle, and vane.
Monday, February 15, 2010	On site to troubleshoot BAM—no data. RS232 error. Reboot.

Table 7-2. Van Gogh School monitoring site visits and field maintenance and operations from December 1, 2009, through February 28, 2010.

Date of Site Visit	Description of Work
Tuesday, December 1, 2009	Flow and leak checks on PM ₁₀ and BC samplers. Clean BAM nozzle and vane. Collect PM ₁₀ and BC data.
Monday, December 7, 2009	Recover log book sheets. Make measurements for A/C unit, insulation, and plywood.
Tuesday, December 22, 2009	Flow checks on PM ₁₀ and BC samplers. Clean BAM nozzle and vane. Collect PM ₁₀ and BC data. BAM flow check and leak check failure. Troubleshoot, but no resolution.
Wednesday, December 23, 2009	Continue troubleshooting BAM flow errors. BAM powered down while parts obtained.
Tuesday, December 29, 2009	LFG samples from 7:00 to 9:00 a.m. Rebuild BAM pump (Medo 925A), clean nozzle multiple times. Eventually find leak in flow adapter O-rings. BAM powered up. Flow checks on PM ₁₀ and BC samplers.
Monday, January 4, 2010	New air conditioner installed. Repair and seal roof.
Tuesday, January 5, 2010	Continue refurbishment: insulation, plywood, floor paint.
Wednesday, January 6, 2010	Additional insulation installed.
Friday, January 8, 2010	Additional plywood installed.
Monday, January 11, 2010	Finalize plywood work. Flow checks on PM ₁₀ and BC samplers. Collect PM ₁₀ and BC data.
Monday, January 25, 2010	Remove Aethalometer™ for upgrade and service.
Friday, February 12, 2010	Flow checks on PM ₁₀ and BC samplers. Clean BAM nozzle and vane. Collect PM ₁₀ and BC data.

Table 7-3. Flow rates for the BAM PM₁₀ monitors and Aethalometer™ BC monitors at the Sunshine Canyon Landfill and Van Gogh School sites from December 1, 2009, through February 28, 2010. BAM flow rates are volumetric (local temperature and pressure) and Aethalometer™ flow rates are at Standard Temperature and Pressure. Reference flows were measured with an NIST-traceable flow standard. BAM target flow rate is 16.7 lpm volumetric to meet the 10-micron cut point of the inlet, with an acceptable range of 16.0 to 17.3 lpm. The Aethalometer™ has no size cut point.

Location	Date	Flow Rates (lpm)					
		BAM as Found	Reference	BAM as Left	Reference	Aethalometer™ as Found	Reference
Sunshine Canyon Landfill	12/1/09	16.6	16.6	16.6	16.6	5.3	5.2
	12/22/09	16.7	-- ^a	16.7	-- ^a	5.6	-- ^a
	12/29/09	16.7	16.9	16.7	16.9	5.2	4.8
	1/11/10	16.7	16.7	16.7	16.7	5.5	5.5
	2/12/10	16.6	16.7	16.6	16.7	-- ^b	-- ^b
Van Gogh Elementary School	12/1/09	16.7	16.7	16.7	16.7	5.9	5.9
	12/22/09	16.7	10.9 ^c	16.7	10.9 ^c	5.9	5.7
	12/29/09	16.7	16.7	16.7	16.7	-- ^d	-- ^d
	1/11/10	16.7	16.7	16.7	16.7	5.9	5.9
	2/12/10	16.7	16.7	16.7	16.7	-- ^b	-- ^b

^a Unable to access roof for reference measurements due to extreme winds

^b Aethalometers™ removed for upgrade

^c See report text

^d Not measured